



Summary of Research
Declaration of Equivalence

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Determination of LT,g-value and U-value of Solatube daylighting systems

Version : Solatube 330 DS

Client:

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Solatube is a brand name for a daylighting system using a tubular entrance method. Using this daylighting system it is possible to bring daylight into areas where this is not feasible with windows or rooflights. TNO determined the thermal energy transmittance (U-value), the light transmittance (LT) and the total solar energy transmittance or g-value for Techcomlight B.V. These parameters are necessary in building design to optimize the façade on insulation as well as light transmittance and solar energy transmittance. A Solatube system is characterized by 4 main parts. The tube is fixed with a roof flashing, the flashing is a hollow steel cylindrical up-stand with flat base that is screwed to the roof. Bituminous roof felt can be welded to the flashing. Between roof and tube we find a rubber seal for airtight sealing. The light tube itself is made out of flat sheet of highly reflecting aluminium. The roof dome is made of acrylic material that has high transmittance. The entire daylighting system fits together using click mechanisms and has additional screws for secure fixing. The Solatube systems are tested using a tube length of 40 cm below the flashing.

The Solatube range has several diameters and different types of domes. This research summary concerns the type 330 DS with a diameter of 53 cm. Type 330 DS is available with 2 different interior appliances. Type 330 DS-O is a plain version with single acrylic pane with Vusion lenses. The type 330 DS-C concerns the office version which has a ceiling box that is insulated and deeper. This part tapers from circular to square, the light-tube is closed by a single acrylic window and the interior diffuser is square with Vusion lenses.



Measurements

The U-value measurements are carried out with a dedicated hotbox specifically built for the test. This enabled to carry out the measurements with the daylight systems mounted in vertical position. The measurements were carried out in accordance with EN-ISO 12567 for windows and doors. The optical measurements were carried out spectrally in accordance with EN 410 using the spectral range of 250-2500 nm. A 2.5 kW HMI light source was used. The measurements were carried out for an angle of incidence of 45 degrees to determine the g-value.

Table 1: Results of measurements and calculations on daylighting systems.

type	Diameter cm	LTA	Direct solar transmittance	g-value	U-value W/m ² K	Comparison with IGU
Solatube 330 DS-O	53	0.58	0.44	0.58	3.0	Double-glazing airfilled
Solatube 330 DS-C office	53	0.51	0.40	0.42	2.2	Double-glazing with Low-e coating

The results of the measurement and calculations are shown in table 1. The U-value of the 330 DS-O is determined on 3.0 W/m²K, this is equivalent to standard airfilled insulating glazing. The 330 DS-C shows a lower U-value of 2.2 W/m²K, this is equivalent to coated insulated glazing.